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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/698,550	10/27/2000	Shervin Moloudi	40884/CAG/B600	5013

7590 04/07/2004

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EXAMINER	
MILORD, MARCEAU	
ART UNIT	PAPER NUMBER
2682	12

DATE MAILED: 04/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/698,550	Applicant(s) MOLOUDI ET AL.	
	Examiner Marceau Milord	Art Unit 2682	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ____ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-93* is/are pending in the application.

4a) Of the above claim(s) ____ is/are withdrawn from consideration.

5)☒ Claim(s) *33-38 and 70-75* is/are allowed.

6)☒ Claim(s) *1-32,39-69 and 76-93* is/are rejected.

7)☐ Claim(s) ____ is/are objected to.

8)☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on ____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. ____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date ____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. ____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: ____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-32, 39-69, 76-93 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vorenkamp et al (US Patent No 6285865 B1) and Molnar et al (US Patent No 6587678 B1).

Regarding claim 1, Vorenkamp et al discloses a mixer (fig. 5 and fig. 19), comprising: a track and hold circuit to track and hold a first signal (506 of fig. 5 which is the first mixer or 1916 of fig. 19 which is also the first mixer) in response to a second signal (col. 1, line 62- col. 2, line 6 col. 6, line 35-col. 7, line 41; col. 12, lines 1-57; col. 26, line 26- col. 27, line 44).

However, Vorenkamp et al does not specifically disclose the feature of a bandpass circuit in cooperation with the track and hold circuit.

On the other hand, Molnar, from the same field of endeavor, discloses a direct conversion receiver for receiving a first input signal and directly down converting it to baseband frequencies (col. 3, lines 26-67). The mixer has a mixer core, represented by switches 92 and 93, each of

which is configured to toggle back and forth in positions 1 and 2 (col. 9, lines 20-67; col. 10, lines 32-64; col. 11, lines 1-40). Furthermore, Molnar shows in figure 13, a mixer that is configured to operate from a differential voltage mode RF input. The mixer core comprises switches 82, 83, 84, and 85. Each switch also comprises two cross-coupled NPN bipolar transistors (col. 12, lines 6-58; col. 14, lines 15-56; col. 16, line 35- col. 17, line 67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Molnar to the system of Vorenkamp in order to improve noise performance and achieve a higher conversion gain.

Regarding claim 2, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) further comprising an input circuit to buffer the first signal before being applied to the track and hold circuit (col. 18, lines 28-55; col. 23, lines 2-30).

Regarding claim 3, Vorenkamp et al as modified discloses a mixer wherein the track and hold circuit comprises first and second output signals, the mixer further comprising a buffer to combine the first and second output signals (col. 12, lines 1-23; col. 18, lines 35-64).

Regarding claim 4, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the bandpass circuit comprises an inductor and capacitor each being coupled to the track and hold circuit, the inductor and capacitor cooperating to provide a time constant related to a frequency of the first signal (col. 18, line 44- col. 19, line 41).

Regarding claim 5, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the track and hold circuit comprises a switch in a path of the first signal, the switch being controlled by the second signal (figs. 35-37; col. 1, line 62- col. 2, line 5; col. 23, line 20- col. 24, line 11; col. 30, lines 35-67).

Regarding claim 6, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the switch comprises a transistor having a gate coupled to the second signal (col. 23, lines 20-53; col. 40, line 31- col. 41, line 31).

Regarding claim 7, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) comprises a source coupled to the first signal (col. 12, lines 4-41; col. 18, lines 28-60).

Regarding claim 8, Vorenkamp et al discloses a mixer (fig. 5 and fig. 19) wherein the transistor further comprises a drain, and the bandpass circuit comprises a capacitor coupled to the drain (col. 23, lines 20-53; col. 40, line 31- col. 41, line 31).

Regarding claim 9, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the bandpass circuit comprises a capacitor coupled to the drain (col. 20, line 29- col. 21, line 32).

Regarding claim 10, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the bandpass circuit further comprises an inductor coupled to the source of the transistor (col. 20, line 29- col. 21, line 32; col. 28, lines 2-63).

Regarding claim 11, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the capacitor and inductor cooperate to provide a time constant related to a frequency of the first signal (col. 35, lines 1-35; col. 37, line 6- col. 38, line 36).

Regarding claim 12, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the bandpass circuit further comprises an inductor coupled to the source of the transistor (col. 20, line 29- col. 21, line 32; col. 28, lines 2-63).

Regarding claim 13, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the transistor further comprises a drain, and the bandpass circuit comprises a capacitor coupled to the drain (col. 20, line 29- col. 21, line 32; col. 28, lines 2-63).

Regarding claim 14, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the capacitor and inductor cooperate to provide a time constant related to a frequency of the first signal (col. 35, lines 1-35; col. 37, line 6- col. 38, line 36).

Regarding claim 23, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the track and hold circuit comprises a transistor having an input adapted to be coupled to the first signal and an output to generate an output signal in response to the first signal, and a switch in a path of the output signal, the switch being controlled by the second signal (figs. 35-37; col. 1, line 62- col. 2, line 5; col. 23, line 20- col. 24, line 11; col. 30, lines 35-67).

Regarding claim 24, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the switch comprises a second transistor having a gate coupled to the second signal (col. 23, lines 20-53; col. 40, line 31- col. 41, line 31).

Regarding claim 25, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the second transistor further comprises a drain coupled to the output of the transistor (col. 23, lines 20-53; col. 40, line 31- col. 41, line 31).

Regarding claim 26, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the bandpass circuit comprises a capacitor coupled to the output of the transistor (col. 23, lines 20-53; col. 40, line 31- col. 41, line 31).

Regarding claim 27, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the second transistor further comprises a source, and the bandpass circuit further

comprises an inductor coupled to the source of the second transistor (col. 20, line 29- col. 21, line 32; col. 28, lines 2-63).

Regarding claim 28, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the capacitor and inductor cooperate to provide a time constant related to a frequency of the first signal (col. 18, line 44- col. 19, line 41).

Regarding claim 29, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the second transistor further comprises a source, and the bandpass circuit further comprises an inductor coupled to the source of the second transistor (col. 20, line 29- col. 21, line 32; col. 28, lines 2-63).

Regarding claim 30, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the bandpass circuit comprises a capacitor coupled to the output of the transistor (col. 23, lines 20-53; col. 40, line 31- col. 41, line 31).

Regarding claim 31, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the capacitor and inductor cooperate to provide a time constant related to a frequency of the first signal (col. 35, lines 1-35; col. 37, line 6- col. 38, line 36).

Regarding claim 32, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the track and hold circuit and the bandpass circuit each comprises a differential circuit, the first and second signals each being differential signals (col. 12, lines 1-57; col. 26, line 26- col. 27, line 44).

Regarding claim 39, Vorenkamp et al discloses a mixer (fig. 5 and fig. 19) comprising: a track and hold circuit having a signal input (506 of fig. 5 which is the first mixer or 1916 of fig. 19 which is also the first mixer), a control input, and a mixed signal output (col. 1, line 62- col. 2,

line 6 col. 6, line 35-col. 7, line 41); and a bandpass circuit (col. 12, lines 1-57; col. 26, line 26-col. 27, line 44).

However, Vorenkamp et al does not specifically disclose the feature of bandpass circuit coupled to the signal input and the mixed signal output.

On the other hand, Molnar, from the same field of endeavor, discloses a direct conversion receiver for receiving a first input signal and directly down converting it to baseband frequencies (col. 3, lines 26-67). The mixer has a mixer core, represented by switches 92 and 93, each of which is configured to toggle back and forth in positions 1 and 2 (col. 9, lines 20-67; col. 10, lines 32-64; col. 11, lines 1-40). Furthermore, Molnar shows in figure 13, a mixer that is configured to operate from a differential voltage mode RF input. The mixer core comprises switches 82, 83, 84, and 85. Each switch also comprises two cross-coupled NPN bipolar transistors (col. 12, lines 6-58; col. 14, lines 15-56; col. 16, line 35- col. 17, line 67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Molnar to the system of Vorenkamp in order to improve noise performance and achieve a higher conversion gain.

Regarding claim 40, Vorenkamp et al discloses a mixer (fig. 5 and fig. 19) further comprising an input circuit coupled to the signal input (col. 12, lines 1-49).

Regarding claim 41, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the mixed signal output comprises first and second output signals, the mixer further comprising a buffer to combine the first and second output signals (col. 12, lines 1-23; col. 18, lines 35-64).

Regarding claim 42, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the bandpass circuit comprises an inductor coupled to the signal input and a capacitor coupled to the mixed signal output (col. 12, lines 1-23; col. 18, lines 35-64).

Regarding claim 43, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the track and hold circuit comprises a switch between the signal input and the mixed signal output, the switch being controlled by the control input (col. 1, line 62- col. 2, line 5; col. 23, line 20- col. 24, line 11).

Regarding claim 44, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the switch comprises a transistor having a gate coupled to the control input (col. 23, line 20- col. 24, line 11).

Regarding claim 45, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the transistor further comprises a source coupled to the signal input (col. 12, lines 1-49).

Regarding claim 46, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the transistor further comprises a drain, and the bandpass circuit comprises a capacitor coupled to the drain (col. 20, line 29- col. 21, line 32; col. 28, lines 2-63).

Regarding claim 47, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the bandpass circuit further comprises an inductor coupled to the signal input (col. 12, lines 1-49).

Regarding claim 48, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the capacitor and inductor cooperate to provide a time constant related to a signal frequency applied to the signal input (col. 18, lines 28-55; col. 23, lines 2-30).

Regarding claim 49, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the bandpass circuit further comprises an inductor coupled to the signal input (col. 18, lines 28-55; col. 23, lines 2-30).

Regarding claim 50, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the transistor further comprises a drain, and the bandpass circuit comprises a capacitor coupled to the drain (col. 20, line 29- col. 21, line 32; col. 28, lines 2-63).

Regarding claim 51, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the capacitor and inductor cooperate to provide a time constant related to a signal frequency applied to the signal input (col. 18, lines 28-55; col. 23, lines 2-30).

Regarding claim 52, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the track and hold circuit comprises a transistor having an input coupled to the signal input and an output coupled to the mixed signal output, and a current source coupled to the mixed signal output, the current source being controlled by the control input (col. 20, line 29- col. 21, line 32; col. 28, lines 2-63).

Regarding claim 53, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the current source comprises a second transistor having a gate coupled to the control input (col. 20, line 29- col. 21, line 32; col. 28, lines 2-63).

Regarding claim 54, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the second transistor further comprises a drain coupled to the mixed signal output (col. 12, lines 1-23; col. 18, lines 35-64).

Regarding claim 55, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the bandpass circuit comprises a capacitor coupled to the mixed signal output (col. 12, lines 1-23; col. 18, lines 35-64).

Regarding claim 56, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the second transistor further comprises a source, and the bandpass circuit further comprises an inductor coupled to the drain of the second transistor (col. 20, line 29- col. 21, line 32; col. 28, lines 2-63).

Regarding claim 57, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the capacitor and inductor cooperate to provide a time constant related to a signal frequency applied to the signal input (col. 18, line 44- col. 19, line 41).

Regarding claim 58, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the second transistor further comprises a source, and the bandpass circuit further comprises an inductor coupled to the source of the second transistor (col. 20, line 29- col. 21, line 32; col. 28, lines 2-63).

Regarding claim 59, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19) wherein the bandpass circuit comprises a capacitor coupled to the mixed signal output (col. 12, lines 1-23; col. 18, lines 35-64).

Regarding claim 60, Vorenkamp et al discloses a mixer (fig. 5 and fig. 19) wherein the capacitor and inductor cooperate to provide a time constant related to a signal frequency applied to the signal input (col. 18, line 44- col. 19, line 41).

Regarding claim 61, Vorenkamp et al as modified discloses a differential mixer (fig. 5 and fig. 19), comprising: a track and hold circuit having a differential signal input (506 of fig. 5

which is the first mixer or 1916 of fig. 19 which is also the first mixer), a differential control input, and a differential mixed signal output (col. 1, line 62- col. 2, line 6 col. 6, line 35-col. 7, line 41); and a bandpass circuit input (col. 12, lines 1-57; col. 26, line 26- col. 27, line 44).

However, Vorenkamp et al does not specifically disclose the feature of a bandpass circuit coupled to the differential signal input and the differential mixed signal output.

On the other hand, Molnar, from the same field of endeavor, discloses a direct conversion receiver for receiving a first input signal and directly down converting it to baseband frequencies (col. 3, lines 26-67). The mixer has a mixer core, represented by switches 92 and 93, each of which is configured to toggle back and forth in positions 1 and 2 (col. 9, lines 20-67; col. 10, lines 32-64; col. 11, lines 1-40). Furthermore, Molnar shows in figure 13, a mixer that is configured to operate from a differential voltage mode RF input. The mixer core comprises switches 82, 83, 84, and 85. Each switch also comprises two cross-coupled NPN bipolar transistors (col. 12, lines 6-58; col. 14, lines 15-56; col. 16, line 35- col. 17, line 67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Molnar to the system of Vorenkamp in order to improve noise performance and achieve a higher conversion gain.

Regarding claim 76, Vorenkamp et al discloses a mixer (fig. 5 and fig. 19), comprising: track and hold means for tracking and holding a first signal in response to a second signal (506 of fig. 5 or 1916 of fig. 19); the first signal being within the frequency band (col. 12, lines 1-57; col. 26, line 26- col. 27, line 44).

However, Vorenkamp et al does not specifically disclose the feature of a limiting means for limiting the response of the track and hold means to a frequency band.

On the other hand, Molnar, from the same field of endeavor, discloses a direct conversion receiver for receiving a first input signal and directly down converting it to baseband frequencies (col. 3, lines 26-67). The mixer has a mixer core, represented by switches 92 and 93, each of which is configured to toggle back and forth in positions 1 and 2 (col. 9, lines 20-67; col. 10, lines 32-64; col. 11, lines 1-40). Furthermore, Molnar shows in figure 13, a mixer that is configured to operate from a differential voltage mode RF input. The mixer core comprises switches 82, 83, 84, and 85. Each switch also comprises two cross-coupled NPN bipolar transistors (col. 12, lines 6-58; col. 14, lines 15-56; col. 16, line 35- col. 17, line 67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Molnar to the system of Vorenkamp in order to improve noise performance and achieve a higher conversion gain.

Regarding claim 77, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19), further comprising means for buffering first signal before being applied to the track and hold means (col. 18, lines 28-55; col. 23, lines 2-30).

Regarding claim 78, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19), wherein the track and hold means comprises first and second output signals, the mixer further comprising means for combining the first and second output signals (col. 12, lines 1-23; col. 18, lines 35-64).

Regarding claim 79, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19), wherein the limiting means comprises an inductor and capacitor each being coupled to the track and hold means (col. 26, line 26- col. 27, line 44; col. 37, line 6- col. 38, line 36).

Regarding claim 80, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19), wherein the track and hold means comprises a switch in a path of the first signal, the switch being controlled by the second signal (col. 23, lines 20-53; col. 40, line 31- col. 41, line 31).

Regarding claim 81, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19), wherein the switch comprises a transistor having a gate coupled to the second signal (col. 23, lines 20-53; col. 40, line 31- col. 41, line 31).

Regarding claim 82, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19); wherein the transistor filter comprises a source coupled to the first signal (col. 12, lines 4-41; col. 18, lines 28-60).

Regarding claim 83, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19), wherein the transistor further comprises a drain, and the limiting means comprises a capacitor coupled to the drain (col. 20, line 29- col. 21, line 32; col. 28, lines 2-63).

Regarding claim 84, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19), wherein the limiting means further comprises an inductor coupled to the source of the transistor (col. 20, line 29- col. 21, line 32; col. 28, lines 2-63).

Regarding claim 85, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19), wherein the bandpass circuit further comprises an inductor coupled to the source of the transistor (col. 20, line 29- col. 21, line 32; col. 28, lines 2-63).

Regarding claim 86, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19), wherein the transistor further comprises a drain, and the bandpass circuit comprises a capacitor coupled to the drain (col. 20, line 29- col. 21, line 32; col. 28, lines 2-63).

Regarding claim 87, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19), wherein the track and hold means comprises a transistor having input means for receiving the first signal and output means for generating an output signal in response to the first signal, and a switch in a path of the output signal, the switch being controlled by the second signal (col. 1, line 62- col. 2, line 5; col. 23, line 20- col. 24, line 11; col. 30, lines 35-67).

Regarding claim 88, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19), wherein the switch comprises a second transistor having a gate coupled to the second signal (col. 23, lines 20-53; col. 40, line 31- col. 41, line 31).

Regarding claim 89, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19), wherein the second transistor further comprises a drain coupled to the output of the transistor (col. 23, lines 20-53; col. 40, line 31- col. 41, line 31).

Regarding claim 90, Vorenkamp et al discloses a mixer (fig. 5 and fig. 19), wherein the limiting means comprises a capacitor coupled to the output of the transistor (col. 23, lines 20-53; col. 40, line 31- col. 41, line 31).

Regarding claim 91, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19), wherein the second transistor further comprises a source, and the limiting means further comprises an inductor coupled to the source of the second transistor (col. 20, line 29- col. 21, line 32; col. 28, lines 2-63).

Regarding claim 92, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19), wherein the second transistor further comprises a source, and the limiting means further comprises an inductor coupled to the source of the second transistor (col. 20, line 29- col. 21, line 32; col. 28, lines 2-63).

Regarding claim 93, Vorenkamp et al as modified discloses a mixer (fig. 5 and fig. 19), wherein the limiting means comprises a capacitor coupled to the output of the transistor (col. 23, lines 20-53; col. 40, line 31- col. 41, line 31).

Regarding claims 15-22, Vorenkamp discloses a mixer (fig. 5 and fig. 19), comprising: a track and hold circuit to track and hold a first signal (506 of fig. 5 or 1916 of fig. 19)

However, Vorenkamp et al does not specifically disclose the feature of a second switch in a second path of the first one of the first differential signals, the first switch being controlled by a first one of the second differential signals and the second switch being controlled by a second one of the second differential signals; a third switch in a first path of a second one of the first differential signals and a fourth switch in a fourth path of the second one of the first differential signals, the third switch being controlled by the first one of the second differential signals and the fourth switch being controlled by a second one of the second differential signals.

On the other hand, Molnar, from the same field of endeavor, discloses a direct conversion receiver for receiving a first input signal and directly down converting it to baseband frequencies. The mixer has a mixer core, represented by switches 92 and 93, each of which is configured to toggle back and forth in positions 1 and 2 (col. 9, lines 20-67; col. 10, lines 32-64; col. 11, lines 1-40). Furthermore, Molnar shows in figure 13, a mixer that is configured to operate from a differential voltage mode RF input. The mixer core comprises switches 82, 83, 84, and 85. Each switch also comprises two cross-coupled NPN bipolar transistors (col. 12, lines 6-58; col. 14, lines 15-56; col. 16, line 35- col. 17, line 67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the

technique of Molnar to the system of Vorenkamp in order to improve noise performance and achieve a higher conversion gain.

Regarding claims 62-69, Vorenkamp et al discloses a differential mixer (fig. 5 and fig. 19), comprising: a track and hold circuit having a differential signal input, a differential control input, and a differential mixed signal output (col. 1, line 62- col. 2, line 6 col. 6, line 35-col. 7, line 41).

However, Vorenkamp et al does not specifically disclose the feature of a second switch between the first one of the differential inputs and the first one of the differential mixed signal outputs, the first switch being controlled by a first one of the differential control inputs and the second switch being controlled by a second one of the differential control inputs; a third switch between a second one of the differential inputs and a second one of the differential mixed signal outputs, and a fourth switch between the second one of the differential inputs and the second one of the differential mixed signal outputs, the third switch being controlled by a first one of the differential control inputs and the fourth switch being controlled by a second one of the differential control inputs.

On the other hand, Molnar, from the same field of endeavor, discloses a direct conversion receiver for receiving a first input signal and directly down converting it to baseband frequencies. The mixer has a mixer core, represented by switches 92 and 93, each of which is configured to toggle back and forth in positions 1 and 2 (col. 9, lines 20-67; col. 10, lines 32-64; col. 11, lines 1-40). Furthermore, Molnar shows in figure 13, a mixer that is configured to operate from a differential voltage mode RF input. The mixer core comprises switches 82, 83, 84, and 85. Each switch also comprises two cross-coupled NPN bipolar transistors (col. 12, lines

6-58; col. 14, lines 15-56; col. 16, line 35- col. 17, line 67). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of Molnar to the system of Vorenkamp in order to improve noise performance and achieve a higher conversion gain.

Response to Arguments

2. Applicant's arguments with respect to claims 1-31, 39-69, 76-93 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marceau Milord whose telephone number is 703-306-3023. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivian C. Chin can be reached on 703-308-6739. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

M Milord

MARCEAU MILORD

Marceau Milord

Examiner

Art Unit 2682